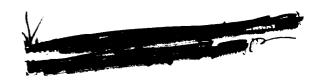
Gro Frice •
CFSTI PRICE(S) \$
Hard copy (HC) #//00 NASA TT F-8721  Microfiche (MF)
THE ELEVEN-YEAR VARIATION CYCLE OF THE BRIGHTNESS, FORM AND DIMENSIONS OF THE COUNTERGLOW  I. S. Astapovich  N66 29333  (ACCESSION NUMBER)  (CODE)  (CODE)  (CATEGORY)
Translation of "Odinnatsatiletnyaya variatsiya yarkosti, formy  Translation of "Odinnatsatiletnyaya variatsiya yarkosti, formy  i razmerov protivosiyaniya  Akad. Sa. SSR, U. 1908  Odinnatsatiletnyaya variatsiya yarkosti, formy  i razmerov protivosiyaniya  Akad. Sa. SSR, U. 1908  Odinnatsatiletnyaya variatsiya yarkosti, formy  i razmerov protivosiyaniya  Akad. Sa. SSR, U. 1908

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, DC. December 1963 45



[From: Astronomicheskii Tsirkular, Vol. 190, 1958, pp. 25-26]

THE ELLVEN-YEAR VARIATION CYCLE OF THE BRIGHTNESS, FORMAND DIMENSIONS OF THE COUNTERGLOW

## by I. S. Astapovich

- 1. Systematic observations of the counterglow were initiated in Ashkhabad in 1942; the author's visual observations resulted in the detection of its diurnal parallax  $\pi \approx 3^{\circ}$  in 1943 [1] and the inconstancy of its form and brightness, particularly during strong aurora borealis [2]. This prompted the author to propose the hypothesis of the gaseous nature of the counterglow [1-3], and refute the Multon-gulden idea of the concentration of meteoric particles near the Lagrange liberation point [4]. The processing of 300 observations in 1942-1945 [5] also revealed the presence of a longitudinal term in the expression for the latitude of the counterglow center [6], and again confirmed the known fact of this center's lag to the west of the antihelium. This enabled us in 1950 to produce the first ephemeris of the counterglow [6]. Another discovery was the non-coincidence of the optical and geometrical centers of gravity. The parallaxes of the different parts of the counterglow were occasionally found to be different, and occasionally revealed a tendency to diminish [7]. This may have been indicative of the flocculent structure of the Earth's gaseous envelop, and the tendency of these heterogeneities to move away from the Earth [7]. The latter should be verified by the use of instruments.
- 2. The observations made after 1945 were less systematic but covered more than one cycle of helioactivity (1942-1957, including the previous ones), and they already justify the following conclusions. In the period of minimum solar activity (1942-1943 and 1951-1953), the counterglow appears to be "compressed" as it were, has a minimum latitude ( $\sim 7 8^{\circ}$ ) and



longitude (  $\sim$  13 $^{\circ}$  ) and is shaped like an ellipse, its large axis being in parallel with the ecliptic; the counterglow is on the whole not very bright. and it is not visible every night under average observation conditions. During the powerful eruptions on the sun that produce the aurora borealis, the counterglow becomes "conspicuous" and several times brighter for 1-2 night; it takes on a nondescript and irregular form with a number of separate tongues; this phenomenon occasionally extends over an area up to 30° longitude and 15-18° latitude, with several centers of greater brightness. The same happens in the periods of maximum solar activity (1947-1948 and 1956-1957); the counterglow became considerably brighter; in Ashkhabad, for example, where the counterglow could not be observed since 1950 because of the increasing city lights, it became visible again in 1956 despite the continued increase of the city illumination. This is particularly noticeable now in connection with the observations carried out under the IGY program (problem 26). During the current increased solar activity, the counterglow is seldom seen as "compressed" or elliptical; it usually covers a huge area (hundreds of square degrees of the celestial schere); it has a very irregular outline which may last for several nights in a row or change within a single night. It is to all this that we call the particular attention of the observers in the current IGY period. . e get the impression that the appearance and form of the counterglow undergo changes during the ll-year cycle of solar activity, similar to those of the solar corona, for example. The general increase in the brightness of the counterglow has its analogy in the well known rising brightness of the comets during the maximum sunsrot activity when increased numbers of new comets are discovered as a result.

It should be pointed out that the zodiacal light reveals parallel variations; in particular, its 3° latitude of July-December 1957 (which is

normal for a period of minimum activity) has now increased to  $6-8^{\circ}$  as has the over-all brightness. But this relationship in the field of the zodiacal light is a great deal more complicated and calls for a separate examination.

Ashkhabad, Dec. 1957.

## BIBLIOGRAPHY

- 1. ATs [Astronomic Circular], 32, 1944.
- 2. Trudy Ashkh. gos. ped. in-ta za 1945 [Transactions of the Ashkhabad State Pedagogical Institute for 1945], 1-2 and 46-50 editions, 1946.
- 3. ATs 66, 1947, also previous references.
- 4. Priroda [Nature] 39, No. 1, 25-32, 1950 (14 titles).
- 5. Izv. Turkmenskogo Fil. AN SSCR za 1950 [Bulletin of the Turkmenian branch of the USSR Academy of Sciences for 1950], No. 3, 67-76.
- 6. ATs, 103-104, 19-23, 1950.
- 7. KISO [Solar Research Commission] Bulletin No. 8-9 (22-23), 35-39, 1953.